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ABSTRACT

The Oral and Written Communication (OWC) course at Ngee Ann Polytechnic was originally intended to equip students with occupational skills (e.g., report- and letter-writing, public speaking) but has expanded to be a course aimed at helping third-year mechanical engineering students to develop third-year project reports. This has been done through the use of the United Nations Development Project (UNDP) material developed for this purpose by lecturers from Ngee Ann and Singapore Polytechnics and the National University of Singapore. Feedback obtained from the mechanical engineering department indicates that students' project reports have improved: in a survey conducted at the close of the 1991-92 academic year by the mechanical engineering department, over 85% of the students who had undergone OWC indicated that they had found it useful. A team approach devised by the biotechnology department would reinforce the features of a formal report specific to biotechnology research. (JP)

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Two Different Approaches to Teaching Final-Year Projects for Mechanical Engineers and Biotechnologists at Ngee Ann Polytechnic - Case Studies Approach

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by

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ED 366 204

Introduction

One crucial feature of the Oral and Written Communication subjects at Ngee Ann Polytechnic is to provide students with the necessary skills to write their final year projects. This paper discusses the approaches used for final year Mechanical Engineering students and Biotechnology students. Both were planned in consultation with the departments concerned and with the technical advice of their lecturers to meet the needs of the students more accurately.

Mechanical Engineering

Background

Courses aimed to improve Ngee Ann students' oral and written communication skills are nothing new to the Language and Communication Skills Centre (LCS) of the Polytechnic. Indeed, such skills have been incorporated into various courses on an ongoing basis since the 1970's, for first, second or third-year students at different points in time.

However, beginning with the 1985-1986 academic year, a formal course known as Oral and Written Communication (OWC) was launched for third-year students only. Its original aim was to equip students about to graduate with occupational skills such as report and letter-writing, public speaking, face-to-face communication skills and the like.

OWC has expanded considerably since its inception. It was initially offered only for students in the Electrical and Electronic Engineering Departments, and in 1985-1986 had a duration of a mere 30 hours (thereby allowing for only a one-hour class per week throughout the academic year); subsequently, the time allocation was increased to 45 hours. Mechanical Engineering (ME) students, on the other hand, were not offered OWC at that time. In their three years of study at the Polytechnic, their only exposure to English consisted of the English and Technical Writing course offered in the first year. This course focussed chiefly on academic skills such as Object and Process Description, and reading comprehension skills.

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As a consequence of this, it gradually occurred to the Mechanical Engineering Department that their students were rather deficient even in basic English. This was reflected, often egregiously, in the writing of the students' compulsory third-year project reports, which were found to be consistently weak both in terms of overall structure (organisation) and language.

The ME Department therefore requested that the LCS also conduct an OWC course for their own third-year students, with effect from the 1991-92 academic year. Their chief concern,

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understandably, was with the third-year project reports. Their expectations were that OWC would equip students to write organised, coherent reports, and to do so with as much grammatical and lexical accuracy as possible, given their basic language deficiencies.

OWC was therefore launched in the 1991-92 academic year, at one and one-half hours per week for the duration of the year, thus making it a 45-hour course. The time allocation was increased to two classroom hours per week (i.e. a 60-hour course) in the current 1992-93 academic year.

Materials Used

OWC for third-year ME students focusses exclusively on third-year project reports for the whole of the first semester of the course. This has been done through the use of the United Nations Development Project (UNDP) materials developed specifically for this purpose by lecturers from Ngee Ann and Singapore Polytechnics and the National University of Singapore, in the mid-1980's.

The UNDP materials cover three important aspects of the project report:

1) Introduction
2) Conclusion
3) Summary

The course co-ordinators have also designed supplementary materials to cover those areas of the report not dealt with by the UNDP manual. Specifically, they are:

1) Design (including Design Requirements, Conceptual designs, and Final Design)
2) Operation and Function (ie, Process Description)
3) Manufacturing

Breakdown by Section: Contents & Implementation Strategies

Introduction, Conclusion and Summary writing are taught by breaking down each one into a series of 'moves', or steps. In the case of the Introduction, there are six prescribed moves, which are as follows:

1) Establishing the field of study
2) Describing existing work related to your project
3) Making claims for your project
4) Explaining your purpose
5) Stating scope and limitations of your project
6) Outlining process/procedure

The Conclusion contains five moves:

1) Justifying your purpose as explained in the introduction
2) Reviewing the scope/process/procedure of the project (which involves making judgements or evaluations)

3) Supporting claims and indicating significance of your work
4) Proposing design improvements to your project (i.e. making recommendations)
5) Suggesting new lines of study

The shorter Summary makes use of four moves:

1) Introducing the project
2) Describing system/methodology
3) Summarising function/results
4) Presenting conclusions

One criticism that has been levelled against this approach lies in the contention that it is overly 'prescriptive', allegedly not allowing full scope for freedom of expression and thus curbing the students' creative potential. In reality, however, this is not the case with our students. In the absence of any sort of structure, experience has consistently shown that they are prone to highly disorganised, even chaotic writing with no clear flow of thought. The presence of such 'moves' allows them something to latch on to, while still providing scope for free expression within those parameters. It should be added that the moves in any event are not meant to be taken as dogma, but rather as guidelines, intended precisely for those students who would otherwise have no idea how to proceed. Specialised projects involving computer software, for example, may not always lend themselves to rigidly following the moves, and in such cases, students receive extra guidance from the lecturer to enable them to make the needed modifications.

In addition to 'models', guided exercises are provided in each UNDP unit to enable the students to master the writing of Introductions, Conclusions and Summaries. These include scrambled texts which students are required to logically order, and gap-filling exercises to help students with relevant points of grammar and vocabulary. Supplementary exercises have also been devised by the course co-ordinators; these involve presenting the students with the 'raw materials' in note form and in scrambled order, from which they must write the required Introduction, Conclusion or Summary.

Similar types of supplementary exercises have also been designed to cover the Design, Operation & Function, and Manufacturing sections. At the same time, there are still other types to provide a greater variety. The all-important Design section, for example, requires each project group to discuss, first of all, the requirements that would go into any design for the machine or system they are expected to work on. They must then go on to present the various conceptual, or preliminary designs they would have considered in the early stages of the project, and why these designs had to be rejected. Finally, they discuss their final design, and why this one was accepted over all the others. To help students write this section, the materials contain transcripts of conversations among project members pertinent to all these points. The students are expected to read and then extract all the information they need to write up the Design section.

For Operation & Function and for Manufacturing, diagrams may be provided of certain machines together with notes, and from these the students are expected to write up the sections.

Due to tight time constraints, much group work is done in class. The students are divided into their project groups and given overhead transparencies on which to write out their tasks. Before the end of class, the transparencies are collected, screened, and corrected by the lecturer in charge. This affords students much crucial, instant feedback about their writing, and a chance to ask very specific questions to clarify any remaining uncertainties.

Testing is carried out through continuous assessment. To make this process as meaningful as possible to the students, one assessment involves the actual taking in of their 'Interim', or Progress Reports, at the end of the first semester. Lecturers on the OWC team grade these reports for structure and language, while the respective ME Project Supervisors grade them for technical content. The Interim Reports are nearly complete project reports at this stage, minus the Conclusion and Summary, and are of course subject to some technical revision at a later stage. The Conclusions and Summaries are therefore collected at a later date, and like the Interim Report, graded on structure and language use.

Initial Results of the Programme

Feedback thus far obtained from the Mechanical Engineering Department indicates that there has been some improvement in the students' writing of their project reports. More would be desirable (and indeed this is why the course was increased from a 45-hour one to a 60-hour one over the past year). The course is being 'fine-tuned' with that end in mind through ongoing liaising with ME staff at various levels, although time constraints continue to remain an intractable problem. It was heartening to learn that in a confidential survey conducted at the close of the 1991-92 academic year by the ME Department, over 85% of the students who had undergone OWC indicated that they had found it useful.

Biotechnology

Background

Last year Ngee Ann Polytechnic produced its first Biotechnology graduates. The English Language Centre's involvement with this diploma course had been to offer to all students in their second year an Oral and Written Communication (OWC) course, one of the objectives of the course being to help prepare the students to write their final year projects. Such a focus was adopted as there were no English courses in Biotechnology's final year of study. Before this new diploma course began at Ngee Ann in 1989, the LCS discussed the details of the proposed second year OWC subject with the department. This department is very supportive of the LCS's role as they recognise the importance of improving their students' language and communication skills not only for their academic studies but also for the working environment of such a rapidly changing discipline as Biotechnology.

At this point without knowing the standard of language of the students or the details of the final year projects, the LCS went ahead and on the advice of the department opted to teach a general formal report writing unit. Besides planning and incorporating relevant exercises, with the permission of the department, the LCS set a quasi-technical report for the students as one of their assignments as part of their continuous assessment.

The first groups of second year students, who were on the yearly timetable at that time, were

given nearly three months to carry out research and write a report on any new developments in Biotechnology related to the medical, food, pharmaceutical or the agrotechnology industry. This gave the students the opportunity to use the research facilities of the library, especially the CD-ROM, and some even collected firsthand data from industry as well as their own department and the University. However, by the time the second set of students entered their second year, Ngee Ann had changed to a modular system which meant retaining the OWC module but teaching it over one semester (i.e. 42 hours; of these, 15 hours are allocated to report writing, including 6 hours for consultation).

These new time constraints limited the scope of the research topics the students could choose from to produce a detailed report in only a few weeks. Taking into account the limited time, the department advised the LCS to use as the basis for this second year report any aspect of subjects studied in that semester, such as microbiology. All such subjects have a laboratory component from which the students can choose to produce an extended laboratory report. This type of formal report still enabled the students to carry out a literature search as well as discuss the results and recommend improvements to the experiment or the techniques used, all of which are essential preparation for the final year project.

A Team Presentation

However, with such a new subject and the many possible research areas available for final year projects, more guidelines were needed in addition to those communication and language skills taught in second year. The department set out their own practical guidelines for what they saw constituted a final year research project at the diploma level. To link the communication factors and departmental requirements, the LCS and the department planned and presented a workshop for the students in their final year to reinforce the features of a formal report specific to Biotechnology research. As many of the lecturers come from different research backgrounds, the department presenters pointed out the varied and differing expectations of the various supervisors and specific aspects of the different types of projects. The stress was on flexibility to meet the objectives of this research exercise and to satisfy the expectations of the academic readers. Part of the LCS's role for the presentation was to remind students of the basics of a formal report, including the linguistic features of different chapters, and to home in on possible problem areas such as tense and tone. For the presentation the LCS, after consultation with the department, produced a chart of the possible headings to be used in the report with relevant reminders concerning department expectations, for example how to write out a scientific reference. Throughout the presentation questions were directed at the students by the lecturers who covered the various sections of the report. This encouraged the students to ask questions as they were preparing and planning to write up the first draft of the report.

Team Approach

This team effort proved to be very successful and not only reiterated what was covered in the OWC course but also with the subject expertise guided the students more accurately when it came to tying content into such a formal report. The success of the workshop was also due to timing as it was presented while the students were still carrying out their research before the initial drafting stage. This workshop also gave the students the opportunity to ask questions and home in on any problems they foresaw technically or linguistically when

writing their project reports.

At this time these final year reports have been submitted to the department and the external examiners. Any recommendations will be considered for inclusion into the second year OWC module and the next joint presentation planned for later this year.

Follow-up

A follow-up to this session at Ngee Ann is the possible involvement of members of the team with representatives of other departments to produce general guidelines for all final year reports at Ngee Ann. Complementing such guidelines to make them especially user-friendly for the students of each department would be the incorporation of features or details necessary for a specific department's reports.

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